

CLAIMS

1. A noise suppressing circuit comprising: a common mode noise
suppressing means for suppressing common mode noise propagating through
a first conductor line and a second conductor line with identical phases; and
5 a normal mode noise suppressing means for suppressing normal mode noise
transmitted through the first and second conductor lines and creating a
potential difference between the conductor lines, wherein:

the common mode noise suppressing means comprises a first
detection/injection section and a second detection/injection section that are
10 connected to the first and second conductor lines at different points and
connected to each other through a path different from the first and second
conductor lines, and that each perform detection of a signal corresponding to
common mode noise or injection of an injection signal for suppressing
common mode noise;

15 when the first detection/injection section performs the detection of the
signal corresponding to the common mode noise, the second
detection/injection section injects to the first and second conductor lines the
injection signal generated based on the signal detected;

when the second detection/injection section performs the detection of
20 the signal corresponding to the common mode noise, the first
detection/injection section injects to the first and second conductor lines the
injection signal generated based on the signal detected;

at least one of the first and second detection/injection sections
incorporates two windings inserted to the first and second conductor lines
25 and coupled to each other so as to produce a leakage inductance; and

the normal mode noise suppressing means incorporates at least one

capacitor for a normal mode having an end connected to the first conductor line and the other end connected to the second conductor line, and reducing normal mode noise in cooperation with the leakage inductance produced by the two windings.

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2. The noise suppressing circuit according to claim 1, wherein:

the first detection/injection section incorporates: a first winding inserted to the first conductor line at a specific first point; a second winding that is inserted to the second conductor line at a point corresponding to the first point and that suppresses the common mode noise in cooperation with the first winding; and a third winding coupled to the first and second windings;

the second detection/injection section incorporates: a first capacitor for a common mode having an end connected to the first conductor line at a second point different from the first point and having the other end connected to one of ends of the third winding; and a second capacitor for the common mode having an end connected to the second conductor line at a point corresponding to the second point and having the other end connected to the one of the ends of the third winding; and

the first and second windings are coupled to each other so as to produce a leakage inductance.

3. The noise suppressing circuit according to claim 2, wherein the common mode noise suppressing means further incorporates a third capacitor for the common mode having an end connected to the one of the ends of the third winding and having the other end grounded.

4. The noise suppressing circuit according to claim 1, wherein the normal mode noise suppressing means incorporates two capacitors as the capacitor for the normal mode that are located at positions that sandwich the two windings coupled to each other so as to produce the leakage
5 inductance.

5. The noise suppressing circuit according to claim 1, further comprising a magnetic core around which the two windings coupled to each other so as to produce the leakage inductance are wound, wherein
10 the core incorporates: a first magnetic path forming portion that forms a magnetic path allowing a magnetic flux for coupling the two windings to each other to pass; and a second magnetic path forming portion that forms a magnetic path allowing a leakage flux produced by each of the two windings to pass.

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6. The noise suppressing circuit according to claim 5, wherein the second magnetic path forming portion includes a portion made of a high-permeability magnetic material and a portion made of a magnetic material having high saturation flux density, and forms a closed magnetic
20 path.

7. A noise suppressing circuit comprising: a common mode noise suppressing means for suppressing common mode noise propagating through a first conductor line and a second conductor line with identical phases; and
25 a normal mode noise suppressing means for suppressing normal mode noise transmitted through the first and second conductor lines and creating a

potential difference between the conductor lines, wherein:

the common mode noise suppressing means comprises: a first
detection/injection section and a second detection/injection section that are
connected to the first and second conductor lines at different points and
5 connected to each other through a path different from the first and second
conductor lines, and that each perform detection of a signal corresponding to
common mode noise or injection of an injection signal for suppressing
common mode noise; and a peak value reducing section that reduces a peak
value of the common mode noise and is provided on the first and second
10 conductor lines between the first and second detection/injection sections;

when the first detection/injection section performs the detection of the
signal corresponding to the common mode noise, the second
detection/injection section injects to the first and second conductor lines the
injection signal generated based on the signal detected;

15 when the second detection/injection section performs the detection of
the signal corresponding to the common mode noise, the first
detection/injection section injects to the first and second conductor lines the
injection signal generated based on the signal detected;

at least one of the first and second detection/injection sections and the
20 peak value reducing section incorporates two windings inserted to the first
and second conductor lines and coupled to each other so as to produce a
leakage inductance; and

the normal mode noise suppressing means incorporates at least one
capacitor for a normal mode having an end connected to the first conductor
25 line and the other end connected to the second conductor line, and reducing
normal mode noise in cooperation with the leakage inductance produced by

the two windings.

8. The noise suppressing circuit according to claim 7, wherein:

the first detection/injection section incorporates: a first winding
5 inserted to the first conductor line at a specific first point; a second winding
that is inserted to the second conductor line at a point corresponding to the
first point and that suppresses the common mode noise in cooperation with
the first winding; and a third winding coupled to the first and second
windings;

10 the second detection/injection section incorporates: a first capacitor for
a common mode having an end connected to the first conductor line at a
second point different from the first point and having the other end
connected to one of ends of the third winding; and a second capacitor for the
common mode having an end connected to the second conductor line at a
15 point corresponding to the second point and having the other end connected
to the one of the ends of the third winding;

the peak value reducing section incorporates: a fourth winding inserted
to the first conductor line at a third point located between the first and
second points; and a fifth winding that is inserted to the second conductor
20 line at a point corresponding to the third point and coupled to the fourth
winding and that reduces the peak value of the common mode noise between
the first and second points in cooperation with the fourth winding; and

at least one of a pair of the first and second windings and a pair of the
fourth and fifth windings are coupled to each other so as to produce a
25 leakage inductance.

9. The noise suppressing circuit according to claim 8, wherein the common mode noise suppressing means further incorporates a third capacitor for the common mode having an end connected to the one of the ends of the third winding and having the other end grounded.

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10. The noise suppressing circuit according to claim 7, wherein the normal mode noise suppressing means incorporates two capacitors as the capacitor for the normal mode that are located at positions that sandwich the two windings coupled to each other so as to produce the leakage

10 inductance.

11. The noise suppressing circuit according to claim 7, further comprising a magnetic core around which the two windings coupled to each other so as to produce the leakage inductance are wound, wherein

15 the core incorporates: a first magnetic path forming portion that forms a magnetic path allowing a magnetic flux for coupling the two windings to each other to pass; and a second magnetic path forming portion that forms a magnetic path allowing a leakage flux produced by each of the two windings to pass.

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12. The noise suppressing circuit according to claim 11, wherein the second magnetic path forming portion includes a portion made of a high permeability magnetic material and a portion made of a magnetic material having high saturation flux density, and forms a closed magnetic

25 path.